



SAFER SUCCESS STORY: Human body modelling cluster

“Working together in the SAFER HBM cluster has significantly sped up and increased the quality of real world safety occupant protection research and system development.”

Lotta Jakobsson, Senior Technical Leader, Injury Prevention, Volvo Cars
Adjunct Professor, Vehicle Safety, Chalmers

- Development and validation/evaluation of state-of-the-art human substitute tools for crash analyses.
- Acknowledged as a major international player in HBM research.
- Enhancement of HBM injury prediction capabilities and important biomechanical research in collaboration with international partners.
- Influence on the global arena to promote open-source and sharing of HBMs.

The aim is to build competence on human body models (HBMs) among the SAFER partners. HBMs are important tools for advanced safety system developments. The challenge is to provide omnidirectional HBMs that can predict injury and have a biofidelic response in scenarios ranging from emergency events to crashes in all different impact directions, representing a broad range of the human population.

Benefit to the project partners and impact on society:

- Enhanced tools for development and assessment of safety systems; the SAFER A-HBM (active adult occupant), an active child occupant model and a pedestrian HBM with detailed head and neck involving muscle activation possibility.
- Enhanced tools for development and assessment of safety systems; i.e. the SAFER A-HBM and an active child model.
- New insights to injury mechanisms and protective principles by combining fundamental biomechanical research and applied research, such as reconstructions of real world crashes with omnidirectional loading.
- Harmonized HBMs and shared model improvements. Several SAFER workshops to identify needs and prioritize future research actions.
- A strong international network that contribute to research.
- Yearly invitations to international human body modelling conferences and workshops.

Communication is the core strategy:

Following some initial projects on HBM evaluations, SAFER project funding was used to recruit one senior researcher and two doctoral students at Chalmers in 2009. The strategy is to have close communication between the key people at all SAFER partners actively working with HBMs and jointly connect to international research groups. Research questions are defined based on needs of all partners and focus strategic areas that complement other international efforts, such as modelling of muscle activity for pre-crash and applied injury prediction capabilities. Close international collaborations ensure access to validation data to assess HBM biofidelity and updated knowledge transfer to the SAFER partners.

Measurable results:

- One Docent, three Ph.D., more than five Lic.Eng.
- Numerous publications and presentations.
- 1st price in the recognized international STAPP car crash conference student paper award.
- HBM enhancements for adult pedestrian and occupant, as well as child occupant.
- A world-first open-source female HBM is being developed.

Funding: 11 MSEK SAFER internal (cash and inkind) and almost 60 MSEK external

Partners: AB Volvo, Autoliv, Chalmers, Royal Institute of Technology (KTH), Sahlgrenska University Hospital (VGR), Umeå University, Volvo Cars, VTI, ÅF

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Period: 2006 - ongoing